In the claims:

1. (Currently Amended) A method for estimating a sequence of symbols, wherein the symbols conform to predetermined valid symbol sequences, comprising the steps:

forming at least two predetermined groups of valid sequences, wherein each group is formed based on possible initial states and includes all possible valid sequences originating from the respective initial states;

receiving a set of symbol measurements;

identifying a candidate sequence for each group of valid sequences, wherein the candidate sequence is a valid sequence from its respective group that is closest to the set of symbol measurements, and wherein each candidate sequence has corresponding decision information; and

determining at least one output decision by selecting a group and corresponding decision information from the identified candidate sequence in response to candidate sequence selection information.

2. (Original) The method of claim 1 wherein each candidate sequence is identified by forming a set of error metrics for each symbol in the set of received symbols, and using the sets of error metrics to select sequences having minimum accumulated errors in time-reverse order.

3. (Original) The method of claim 1 wherein the candidate sequence selection information is fed forward from a prior output decision.

4. (Original) The method of claim 1 wherein the recited steps are performed in each one of a plurality of parallel stages, and wherein the at least one output decision of each stage is provided to at least one other stage as at least a portion of the candidate sequence selection information.

5. (Original) The method of claim 4 wherein the respective sets of received symbols for the plurality of stages are overlapping.

6. (Original) The method of claim 1 wherein the groups are formed according to possible initial states, and where each group corresponds to a single state.

7. (Original) The method of claim 1 wherein the groups are formed according to possible initial states, and where each group corresponds to a plurality of initial states.

8. (Original) The method of claim 1 wherein the step of determining at least one output decision is performed in response to soft information.

9. (Currently Amended) A method for estimating a sequence of symbols, comprising the steps:

forming groups of paths through a trellis based on the initial states of the paths;

forming sets of sequential samples of symbols, wherein the sets comprise at least a first set of samples and a next set of samples;

for each set of samples, determining a plurality of minimum error paths and corresponding candidate decision information, wherein each group has a minimum error path and corresponding candidate decision information;

selecting a group corresponding to the first set of samples and its minimum error path

and its corresponding decision information, where the selection is based on prior state information; and

using at least a portion of the selected corresponding decision information to select a group corresponding to the next set of samples and its corresponding decision information.

10. (Original) The method of claim 9 wherein a portion of the sequential samples in the first set of sequential samples are repeated in a portion of the sequential samples in the next set of sequential samples.

11. (Original) The method of claim 9 wherein each group corresponds to a single possible prior state.

12. (Original) The method of claim 9 wherein each group corresponds to a plurality of possible prior states.

13. (Currently Amended) A decoder comprising:

at least one sequence error estimator comprising an input to receive symbol error metrics and a plurality of candidate path outputs, wherein said at least one sequence error estimator identifies a plurality of candidate paths and decision information corresponding to each of said candidate paths, and provides said decision information at said candidate path outputs; and,

a selector connected to said at least one sequence error estimator, said selector having inputs connected to said candidate path outputs, a selector output for providing an output decision, and a selection input for determining which of said inputs is interconnected to said selector output, thereby providing an output decision corresponding to the decision

information on ~~the~~ said interconnected ~~said~~ input.

14. (Original) The decoder of claim 13 wherein said at least one sequence error estimator comprises a plurality of sequence error estimators, and wherein at least a portion of the output decision of a first of said plurality of sequence error estimators is provided to said selection input of another of said plurality of sequence error estimators.

15. (Original) The decoder of claim 13 wherein said sequence error estimator comprises a plurality of interconnected selectors and adders wherein candidate paths are identified in time reverse order.

16. (Currently Amended) A decoder device comprising:

a branch error metric block for generating incremental error estimates;

a plurality of candidate path identification blocks, each of said candidate path identification blocks providing a set of outputs; and,

a plurality of selection devices, wherein each one of said plurality of selection devices is connected to said set of outputs of each one of said plurality of candidate path identification blocks, where each selection device provides data outputs, and wherein the data outputs of each of said plurality of selection devices is used to select the data outputs of another of said plurality of selection devices.

17. (Original) A decoder device comprising:

means for generating branch error metric values;

at least one decoding means connected to said means for generating branch error metrics, wherein each decoding means comprises:

a sequence identification means for identifying a set of candidate sequences in response to said branch error metrics, wherein each candidate sequence within said set of candidate sequences has associated candidate decision information; and

a selecting means for receiving said associated candidate decision information, and for providing output decision information, said output decision information being generated in response to said associated candidate decision information, and output decision information from a selecting means of another decoding means.

18. (Currently Amended) The decoder of claim 17 wherein said a selecting means uses said output decision information from a selecting means of another decoding means to select candidate decision information from one of said candidate sequences.

19. (Original) The decoder of claim 17 wherein said sequence identification means computes candidate sequences by operating in a time reverse order.

20. (Original) The decoder of claim 17 wherein said sequence identification means comprises a plurality of min-select means.

21. (Original) The decoder of claim 17 wherein said selecting means is a multiplexer.

22. (Original) The decoder of claim 17 wherein said output decision information includes candidate decision information from one candidate sequence within said set of candidate sequences.

23. (Original) The decoder of claim 17 wherein said output decision information includes soft decision information.

24. (Original) The decoder of claim 17 wherein said at least one decoding means comprises a first and a last decoding means, and wherein said output decision information of said last decoding means is buffered for a first time frame and then provided to said last decoding means in another time frame.

25. (Original) A method of recovering information from a plurality of state observations of system comprising the steps:

identifying a candidate sequence for each initial state of a system having a plurality of initial states, wherein each candidate sequence has an associated candidate set of decision information;

receiving initial state decision information; and

selecting a single candidate set of decision information from the candidate sets in response to the received initial state information.

26. (Original) The method of claim 25 wherein the candidate sequence for each initial state is identified in time-reverse order.

27. (Original) The method of claim 25 wherein the candidate set of decision information comprises at least one data bit decision.

28. (Original) The method of claim 27 wherein the candidate set of decision information further comprises soft decision information.

29. (Original) The method of claim 28 wherein the soft decision information comprises a measure of reliability of the at least one data bit decision.

30. (Currently Amended) The method of claim 25 wherein the step of identifying a candidate sequence for each initial state comprises the steps of:

computing branch error metrics;

computing and comparing path metrics; and

identifying a path having the smallest path metric for each initial state.